

William S. Bathgate EE, ME  
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Pinckney, MI 48169  
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**BACKGROUND:**

I hold an electrical engineering and mechanical engineering degree and previously was employed through late 2015 for 8 years at the Emerson Electric Company. While at Emerson Electric I was the Senior Program Manager for Power Distribution Systems and in charge of an RF and IP based digitally controlled high power AC power switching system product line in use in over 100 countries and I was also directly responsible for product certifications such as UL, CE, PSE and many other countries electrical certification bodies. I am very familiar with the electrical and electronic design of the AMI meters in use because I was responsible for very similar products with over 1 Million units installed across the world. I have done this analysis due to my own curiosity without conflict of interest of this new technology.

I have 40 Years work experience in design and deployment of:  
High tech power management systems, UPS and power distribution  
Switched Mode Power Supplies  
Electrical and Electronic hardware engineering  
Computer systems engineering  
Radio Systems design and testing  
High Current and High Voltage switches  
Internet communications using both wired and wireless technologies  
UL, CE (Europe), Africa, Japan, Australia and China product safety certifications  
Cyber encryption and protection of Radio Communications using digital signals  
RFI/EMI mitigation

**Relative to comments to the following 3 questions:**

First a couple of clarifications are in order - the AMI radiating meter and the non-radiating meter are identical in all respects. They have the same components, boards, housing etc. The Opt-Out meter is the same as the non-Opt-Out meter in all respects, the Opt Out Meter is configured with the radios turned off or "deactivated".

The AMI meters have two radio transceivers; one operates in the same frequency of a cell phone or microwave oven of ~900 MHz, which is for a link to the utility and the second radio operates in the same frequency as a wireless home router or a PC at ~2.4 GHz. The 900 MHz radio transmits between .6 to 1.0 watts depending on the installed surrounding conditions, such as reflective surfaces nearby like bouncing off a neighbors home walls. The ~2.4 GHz is called a Home Area Network (HAN) that operates at .25 to .40 watts depending on the surrounding surfaces. The HAN is intended to permit connection of the AMI meter to the home internet devices such as Wi-Fi thermostats and Wi-Fi enabled home appliances.

**1. Question: If a "deactivated" meter can be turned on remotely**

Answer: By deactivated I believe you are referring to the two Transceivers (a transceiver is both a transmitter and a receiver) within the ITRON AMI Meter. Only the transmit function is turned off, but the receive function is not ever turned off. To accomplish this the source of power for these two circuit chips would have to be cut off. If this was done to the meter it would no longer function at all because the CPU (Central Processing Unit-Brain for circuit board) for all the functions of the meter are on the same circuit board as the radio circuits. So the answer is yes.

It is important to understand the receive function is always on and can receive a command to re-enable the transmit function on both radios anytime by the utility without sending out a tech on site. The radios from one meter talks to a neighboring meter which then talks to another neighboring meter, by sending the waves through all homes in the neighborhood. This is very dangerous to people who are sensitive to radio frequencies (RF). The utility can use this network connection to re-active the meter. This can all be done without the customer being aware of it.

Proof of this capability is demonstrable when a home that has the Opt-Out AMI meter installed is transferred to a new owner/occupant, suddenly the Opt-Out meter becomes a regular radiating meter without a tech from the utility going to the home. A conventional analog mechanical meter does not have the ability to broadcast.

**2. Question: If a "deactivated" meter is still broadcasting**

This is not a question that allows for a simple yes or no answer. The utilities can send a signal 24/7 to any deactivated meter and the meter will broadcast back to the utility any information they request.

**3. Question - Any other reasons a deactivated meter is bad (with proof)**

Answer: Both AMI meters inject a pair of interfering voltages overlaid on to the standard 60Hz (in Light blue)

This interference is called Radio Frequency Interference and Electromagnetic Interference called RFI and EMI. This RFI/EMI is the result of a defective design of the Switched Mode Power Supply in the AMI meters which is used to power the electronics. This power supply is used to convert the 240 Volts AC to the various DC voltages required.

In my past responsibility in Electrical and Electronic designs this DTE/CeCO meter would not be acceptable for deployment. This series of interfering voltages creates what is commonly called "Dirty Electricity". The interference displayed also indicates that there is an out of control interference because the oscilloscope indicates there is no defined pattern to the interference. Besides the effects on health it also degrades the performance of home appliances leading to appliance damage such as furnaces, washers and dryers, refrigerators. These appliances have not been designed to operate in such an environment.



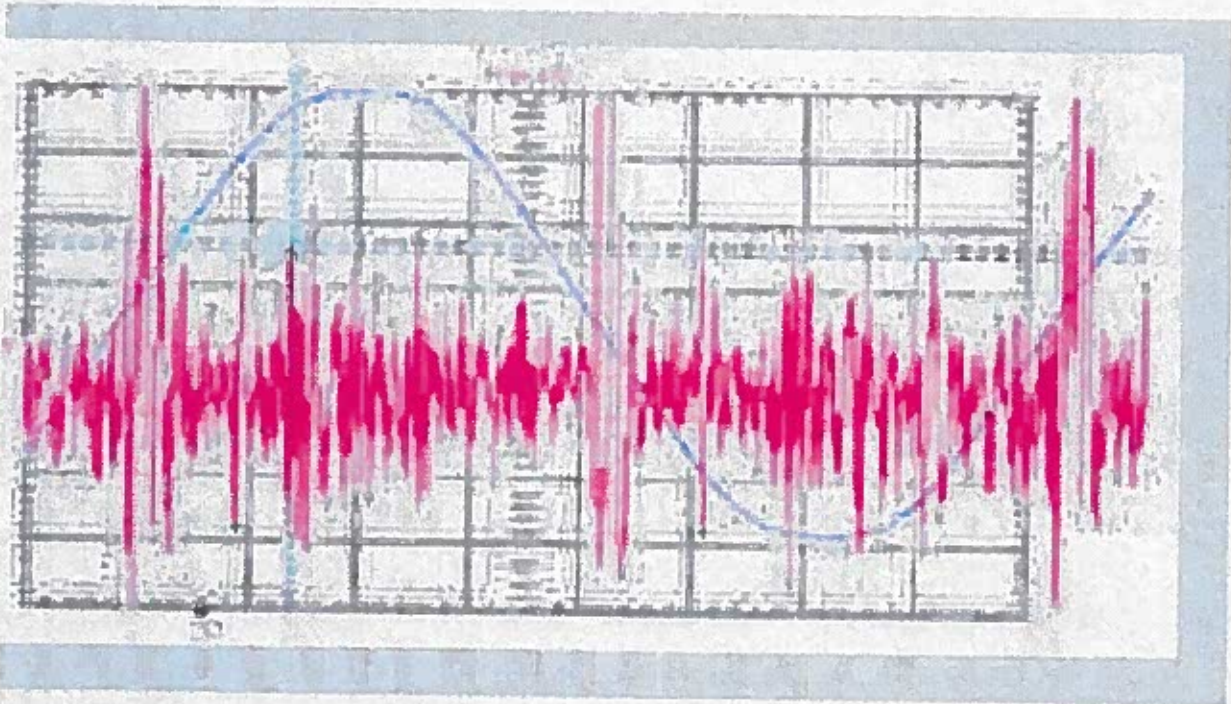
Once the RF/EMI gets injected on to the home wires it become very expensive to mitigate the oscillations after it gets injected.

Noted epidemiologist Dr. Samuel Milham connects dirty electricity with heart disease, cancer, diabetes, and neurological disorders like ALS and suicide.

• <http://www.electricsense.com/5229/dirty-electricity-electrification-and-the-diseases-of-civilization/>

This waveform displayed is the same as an oscilloscope trace would look like, you cannot see this on a common voltmeter. Now we have introduced the effects of EMI/RFI to the same wire carrying the house current. This effect can be better depending on the environment especially how good the house earth ground is magnetically coupling the house voltage currents. There are many variables that affect this waveform. The smooth curve light blue is the standard 60 Hz line voltage.

The red signal is the RF/EMI. This is common on every meter I have tested.



Respectfully submitted,

*William S. Bathgate*

William S. Bathgate



To whom it should concern,

Dec 2015: AMI Smart Meter Installed against my will despite me opting out.

My bills immediately double and almost triple-I can provide proof

I began having memory loss, insomnia, electrical current feelings in body, ringing in ears etc. Diagnosed with poss Lyme and Dementia

I call repeatedly about my extreme bills. Reps state only time that increase is seen is if a neighbor is stealing power from you. May 2016 A rep(Jennifer) comes and reluctantly tested the meter. After stating she never had a defective meter, she states with shock that my meter tested as defective. She stated she had no extra meter with her.

I never receive a new meter or explanation. I call DTE repeatedly and told there is no record of anyone from DTE out to test the meter.

September 2016 I send notarized letter by certified mail giving DTE 7 days to correct the meter or I will have my analog meter installed. Never hear from DTE and proceed to analog meter.

November 2017 – I call and at my inquiry and request DTE opens a billing investigation and told I will be contacted by phone.

December 21 2016- my 12 year old son wakes up with a swollen uvula and has extreme difficulty breathing and can't talk. After calling doctor I go to leave with my three children to get son medical help, I find DTE arriving in my 400' driveway with a van and truck blocking me from being able to leave. For an hour from 10am-11am the **DTE workers refuse after repeated pleas from me , for them to move the truck** due to my sons medical emergency. A third truck arrives and they only move the trucks when completed with shutting off my power. (I have never missed a bill and have actually overpaid).

My 12 year old son is so severe he is admitted into st john pediatric floor by 12 (noon)....within an hour of leaving my home.

I spent 3 days trying to get power back on for Christmas weekend and for my sick son to come home to heat after two days in the hospital. Only by having a friend at DTE with connections help us did the power get turned on. my sick son and other kids had to stay at relatives and friends for the holiday weekend.

Thursday 12-22-2017 a rep (same jenny that did testing in may) came out to install a new meter. When reminded of the defective meter she advised it was programmed with the wrong rate code (for industrial) and was surprised I never received written notice from DTE and that my meter and bill was never fixed.

I'm still paying double the bill I used to pay in 2015. Also the reps advised that I have had to pay the opt out fees despite the fact that they aren't even capable of reading my meter wirelessly yet.

I have contacted the attorney general office as well as the public service commission regarding our being blocked from receiving medical help during an emergency (it is a law that shut off must cease during and emergency).....received no help.

I demand help and attention to this medical emergency situation and I will have my right to an analog meter.

Brian Carten  
Former Police officer and Firefighter  
810-305-3534-call anytime



Jeanine Susan Deal

3508 Capital Ave SW ~ Battle Creek, MI 49015 ~ (269) 965-0461 ~ j.s.deal@att.net

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February 20, 2017

Re: Testimony to the Energy Policy Committee

In 2013, about 6 months after getting my very first cell phone, I had to stop putting the phone to my ear because of burning pain I felt when I did. The pain went away, but returned without cell phone use about two years later.

In November of 2014, our natural gas company, SEMCO Energy, wanted to upgrade our two gas meters, even though the old meters were working fine. The installers told us the meters only transmit once per month to collect the meter read, so we allowed the installation.

About 6 months later, the pain returned to my "phone ear" without cell phone use, which was confusing to me at first. Then I remember the new gas meters.

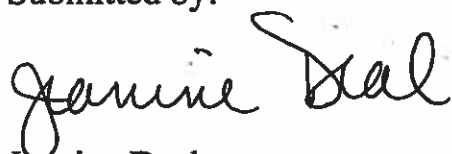
I contacted SEMCO Energy, and Dave Williams, the Regional Operations Manager, sent me specifications on their new gas meters. It turns out they send signals over 450,000 times per month, not just once. They pulse an average of 10 times per minute, non-stop. And per Dave Williams, they ARE "stronger" than their old meters. No wonder my phone ear started hurting again.

We asked SEMCO to remove their new meters, and replace them with non-transmitting meters. They said they could NOT do that. The only thing they COULD do was completely shut-off our natural gas service, and then remove their new meters.

So I contacted the Michigan Public Service Commission, the Attorney General's office, and the Better Business Bureau. None were able to help me.

This is why I am asking you to support House Bill 4220, that will allow public utility customers the choice between analog public utility meters, and non-analog.

Submitted by:

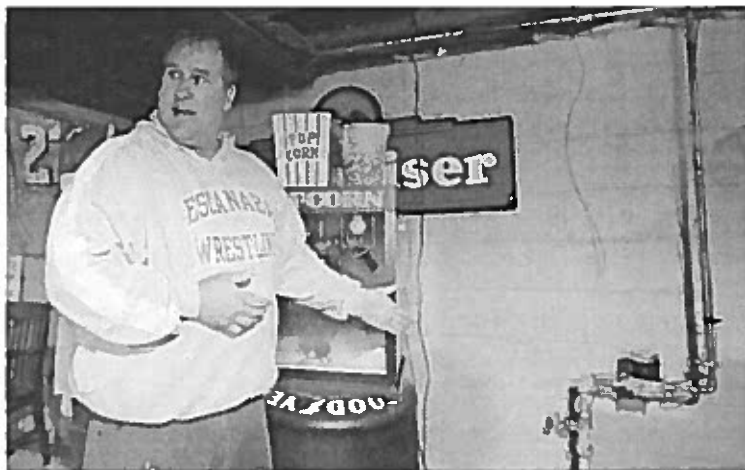
  
Jeanine Deal





Michigan

## Bay City smart meter rollout leaves residents with plumbing bills, concerns and questions



Mark Niernberg points out the water meter at his Bay City home Thursday, July 10. Niernberg opted to not sign a waiver to have a third-party vendor replace his water meter, fearing that his water system might break. Bay City contracted Utility Partners of America to replace about 35,000 water meters across the city with new, "smart meters." If a meter needs to be completely replaced, the company is having residents sign a waiver saying the company isn't responsible for any damages. (Ylat Yossior | The Bay City Times)



By Andrew Dodson | [adodson@mlive.com](mailto:adodson@mlive.com)

[Email the author](#) | [Follow on Twitter](#)

on July 14, 2014 at 7:15 AM, updated September 09, 2014 at 5:30 PM

**BAY CITY, MI** — Bay City officials say the switch to electronic "smart meters" for the city's electric and water utilities makes operations more efficient and provides more usage transparency to residents.

But as the \$6.8 million program continues to roll out, it has caused headaches and expensive plumbing bills for some residents.

Terry Basmadjian, who lives on Bay City's West Side, said she paid \$160 to have a plumber replace a valve that broke when her meter was swapped out last week. Mark Niernberg, fearing he would have to pay a similar, or higher, bill, opted against switching his meter out for now, as the installer requires residents to sign a waiver saying the company isn't liable for any damages during the install.

"I'm all for the new meters, but if they switch this out, I'll likely have to hire a plumber to fix it," Niernberg said. "If I have a plumber come out and update my water lines, and then the city comes in to install the meter, and something breaks, I would need to pay to have a plumber come out again and fix it. I think this whole notion that the homeowner is responsible is ridiculous."

City officials are now looking into these issues to ensure the estimated 15,000 water meters can be installed by year's end without costing customers hundreds of dollars.

"As of now, I've only heard of one formal complaint," said Bay City Manager Rick Finn. "But I've been told there are some concerns about the process. We need to look into this more before we make any decisions on if we need to make some changes."

### Problems with the install

When Terry Basmadjian signed the waiver, she didn't realize it included a sentence that said she would be liable for any damages that could occur during the installation process.

"I just thought they needed my permission to start the work," she said. Basmadjian is the step-mother to Bay City Commissioner Kerice Basmadjian, 7th Ward.

Terry Basmadjian realized the water valve was broken when the installer tried to turn water back on after swapping the meter. It was likely the first time the valve had been turned off since moving into the residence, she said.

"The installer then told me his company isn't responsible because I signed the waiver," Basmadjian said.

After a \$160 visit from Bay City-based Doug's Plumbing, her valve was replaced.

Bob Dion, the city's water distribution metering supervisor, said the city has received about a dozen calls per day from residents who experienced a broken valve as a result of the smart meter install.

"These are old houses, and many of them haven't exercised their valves ever," he said. "They've never been turned off, which is why they break easily."

As a result, a resident ends up hiring a plumber that can cost up to hundreds of dollars.

Doug Trerice, owner of Doug's Plumbing, said his company has replaced about 100 valves since the water meter swaps started.

Trerice said older valves are made of brass, which is more susceptible to rust than modern valves, which are made of a stronger type of alloy with Kaplan coating.

"We've definitely been busy during this switch," he said.

Trerice recommends residents exercise their valves at least once per year.

"When you turn them off, though, do it slowly," he said. "When you turn it back on, also do it very slowly."

### Upcoming solution?

Terry Kilburn, the city's water and sewer supervisor, said some residents have paid "several" hundreds of dollars to plumbers to have their valves repaired, as a result of the smart meter rollout, prompting the city to act swiftly and find a solution.

He says the city is looking into creating a program that would give residents a list of local plumbers to replace the valves. Under the proposed plan, plumbers would submit a bid for the cost of a valve replacement, Kilburn said, and become an approved vendor of the city.

"Residents would be more comfortable if we can say, here's a plumber and here's how much it's going to cost, instead of telling them to just call a plumber," Kilburn said.

The resident would still pay for the valve replacement, Kilburn said.

"This is something that's at the top of the list to act on," he said. "It's very important."

Any program or ordinance change would require the approval of the Bay City Commission.

### Smart meter history and process

The Bay City commission approved the upgrade to the smart meter system in October 2012. The move means fewer visits from meter readers and more details to consumers about their usage.

Using a radio transmitter, the meters send information daily about homeowners' electrical and water consumption to small towers placed around the city, which bounce the data to city servers.

The system can alert city utility officials earlier than the existing system of irregular usage, such as a major leak underground that could cost residents big dollars.

"If someone is out of town and their pipes burst, we'll receive an alert that shows a spike in usage, allowing us to respond and turn off the water before it becomes a big problem," said Dion. "If that happened today, we'd rely on residents calling us saying that there's water coming out of the basement windows of their neighbor's house."

The \$6.8 million upgrade was paid for using money from a 2008 bond sale and electric and water rates, said George Martini, the city's fiscal services director. The bonds are expected to be paid off by the end of next year.

The Bay City Commission recently approved a rate increase of \$3 to the customer service charge and 11-cents on the usage unit of 100 cubic feet of water.

There are four city employees swapping out meters for businesses and industrial properties, but most residents will see a Utility Partners of America truck parked outside their home. UPA, based in Greenville, S.C., was hired based on recommendation from Badger Meter, the Wisconsin-based company that manufactures the smart meters. Dion said city employees couldn't handle the sheer volume of replacing all water meters, prompting the city to hire a third-party.

Electric meter swaps started in February and are more than 80 percent complete. Water meter swaps, which started in April, are about 20 percent complete.

"We're a little behind, but still think we can finish up the work by the end of the year," said Dion.

Once electric meters are swapped, those workers will transition to water meters, said Dion.

Representatives from an out-of-state call center are calling residents to schedule one-hour appointment windows to install the new meter and radio transmitter. Houses with updated meters only require the installation of the handheld-sized transmitter, which takes about 20 minutes. Installation of a new meter can take up to an hour and requires turning water off in the household for about a half hour, said Dion.

"The biggest hold up is trying to get people at their houses when an installer can be there," Dion said. "We need an adult at the house in order to do the install."

### **Job concerns**

Despite some of the benefits of smart meters, some residents are questioning why the city needs them.

"Do we really need them?" asked Bob Philip, who had his meter recently replaced. "That — and how many jobs are they eliminating? The city doesn't need more job loss."

According to Finn, the city will eliminate four of its five meter reader positions, beginning next fiscal year, which starts July 1, 2015.

All five meter readers are budgeted to stay on the payroll for the current fiscal year, which started July 1. Once the entire system is online, the positions would be phased out if an employee opted to leave during the current fiscal year, said Martini.

It costs about \$85,500 per meter reader with salary and fringe benefits, said Martini. Meter readers, who check water and electric meters, earn between \$17.35 to \$18.98 per hour and receive medical benefits from the city.

The city will keep one meter reader on to deal with any glitches with the new smart meter system, said Finn. Savings from the four eliminated positions work out to about \$342,000 for next fiscal year.

Martini said the city would work to find other positions in the water or electric departments for impacted employees.

### **Other concerns**

It's not just broken water valves that are rubbing residents the wrong way during the transition to smart meters.

Ray Armstrong said his meter has made a loud clicking noise, but city officials have told him it would be replaced.

Others say they're concerned about possible health issues due to the transmitter that sends off usage data to the city's servers.

"I've had residents call me saying the transmitters are a real concern for them," said Commissioner Elizabeth Peters, 2<sup>nd</sup> Ward.

Kim Haken, manager of Columbus Laundromat, which recently had to pay a \$15,000 water bill after the city installed an incorrect meter reader and an ongoing clerical error, said city officials told her a new meter could increase her water bill.

Kilburn said that could be the case, but the new meter could also work in favor of the customer.

"If their meter was running slow before, it would benefit the city," he said. "But if it was running fast, it would benefit the customer."

Bay City Commission President Lori Dufresne, 4<sup>th</sup> Ward, said she has had a resident complain about the meter being too loud and others about the waiver process as part of installation.

"I guess it's one of those things that we need more discussion on in order to smooth it out and make it feel easier for the residents," she said.

Personally, Dufresne, who works in Midland, said it was difficult for her to schedule a time to coordinate with a scheduler to install the meter.

"It's a challenge to find a convenient time," she said.

Several residents interviewed acknowledged the professionalism of the installers from UPA.

"We had a younger kid come to the house and he was very open with me," Nierenberg said. "When I told him I wasn't going to sign the waiver because I didn't want to deal with a broken valve, he even agreed with me and told me that I should get a plumber to look at it first."

Finn said opting out of the smart meter program won't be encouraged, but it is possible. Residents who decide against the new technology, however, would have to pay hefty fees for a meter reader to come to their residence each month.

"When we show the cost of a monthly reading to a resident, it becomes obvious pretty quickly that it's not in their best fiscal interest," he said.



Robert L Phillips  
3510 Helen Ave  
Lincoln Park, MI 48146

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February 21, 2017

Ladies and Gentlemen:

**I support the draft you prepared.** The fact that the Federal government paid DTE 89 million dollars for smart meter installation, makes the project a little suspect. Here are my suggestions:

First: On page 2, lines 16 and 17. Replace text with

... UNLESS THE CUSTOMER HAS REQUESTED THE  
INSTALLATION OR CHANGE.

The present wording leans strongly toward the utility and assumes the change ("upgrade") is a good one. I disagree. I believe the change is harmful.

Second: On page 6, delete lines 4 through 12.

A UTILITY MAY REPORT DATA RELATING TO ELECTRIC OR  
COMPRESSED NATURAL GAS VEHICLE FUELING TO THE  
DEPARTMENT OF TREASURY.  
THE DEPARTMENT OF TREASURY SHALL USE THAT  
INFORMATION STRICTLY FOR TAXATION PURPOSES AND  
SHALL NOT SHARE THAT INFORMATION WITH LAW  
ENFORCEMENT WITHOUT A WARRANT, AND THAT  
INFORMATION IS NOT SUBJECT TO DISCLOSURE UNDER  
THE FREEDOM OF INFORMATION ACT, 1976 PA 442, MCL  
15.231 TO 15.246, EXCEPT FOR AGGREGATE DATA USED  
FOR RESEARCH PURPOSES IN A NONIDENTIFYING MANNER.

I object to that language for 2 reasons.

First, because I am already paying tax for the electricity. Now you want to consider how the electricity is being used, in order to charge more tax (?), I don't want you to do that. It clouds the issue. If you want to tax the fuel used in my lawnmower, deal with it separately.

If I buy an electric vehicle, I want to charge it with my water based generator. None of that relates at all to the utility or taxation.

Thank you.,

**Robert**

Robert L Phillips  
Robert@rlpeba.com





Greetings:

Unfortunately, we couldn't be present today but felt compelled to comment on H.B. 4220. As members of the "**REPUBLIC**" we certainly understand how our system of government works. In our "**REPUBLIC**" no one can be forced to do anything against their will. After careful examination of the so-called smart meter we've decided that such a device is more of a liability than an asset. For this, we stand in **OPPOSITION** to the implementation of so-called smart meters and in support of H.B. 4220. This bill is very important and we, as well as many others, won't rest until it's passed and signed into law.

In Liberty,

Gregg Bazzani



Scott Bazzani



14590 Mulberry  
Southgate, MI 48195



**Before the Michigan House Energy Committee  
Hearing on HB 4220 - Meter Choice Bill**

**December 21, 2017**

**Exhibit to accompany testimony of  
David Sheldon\***

**Testifying For the Bill**

**The exhibit consists of excerpts from a report of a federal government task force charged with examining the privacy implications of smart meters and smart grid.**

**\* David Sheldon holds an MBA, B.A. in physics and economics, is certified in software engineering and has 20 years experience in software development prior to his retirement.**





# Guidelines for Smart Grid Cyber Security: Vol. 2, Privacy and the Smart Grid

*The Smart Grid Interoperability Panel–Cyber Security Working Group*

August 2010

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What follows are excerpts from NISTIR 7628, a report of the National Institute of Science and Technology, U.S. Dept of Commerce. The complete report may be found here: [https://www.nist.gov/sites/default/files/documents/smartgrid/nistir-7628\\_total.pdf](https://www.nist.gov/sites/default/files/documents/smartgrid/nistir-7628_total.pdf)  
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## 5.1 WHAT IS PRIVACY?

There is no one universal, internationally accepted definition of “privacy,” it can mean many things to different individuals. At its most basic, privacy can be seen as the right to be left alone.<sup>4</sup> Privacy is not a plainly delineated concept and is not simply the specifications provided within laws and regulations. Furthermore, privacy should not be confused, as it often is, with being the same as confidentiality; and personal information<sup>5</sup> is not the same as confidential information.

Confidential information<sup>6</sup> is information for which access should be limited to only those with a business need to know and that could result in compromise to a system, data, application, or other business function if inappropriately shared.<sup>7</sup>

It is important to understand that privacy considerations with respect to the Smart Grid include examining the rights, values, and interests of *individuals*; it involves the related characteristics, descriptive information and labels, activities, and opinions of individuals, to name just a few applicable considerations.

For example, some have described privacy as consisting of four dimensions:

1. **Privacy of personal information.** This is the most commonly thought-of dimension. Personal information is any information relating to an individual, who can be identified, directly or indirectly, by that information and in particular by reference to an identification number or to one or more factors specific to his or her physical, physiological, mental, economic, cultural, locational or social identity. Privacy of personal information involves the right to control when, where, how, to whom, and to what extent an individual shares their own personal information, as well as the



right to access personal information given to others, to correct it, and to ensure it is safeguarded and disposed of appropriately.

2. **Privacy of the person.** This is the right to control the integrity of one's own body. It covers such things as physical requirements, health problems, and required medical devices.
3. **Privacy of personal behavior.** This is the right of individuals to keep any knowledge of their activities, and their choices, from being shared with others.
4. **Privacy of personal communications.** This is the right to communicate without undue surveillance, monitoring, or censorship.

Most Smart Grid entities directly address the first dimension, because most data protection laws and regulations cover privacy of personal information. However, the other three dimensions are important privacy considerations as well; thus dimensions 2, 3, and 4 should also be considered in the Smart Grid context because new types of energy use data can be created and communicated. For instance, we can recognize unique electric signatures for consumer electronics and appliances and develop detailed, time-stamped activity reports within personal dwellings. Charging station information can detail whereabouts of an EV. This data did not exist before the application of Smart Grid technologies.

#### **5.3.5 General Invasion of Privacy Concerns with Smart Grid Data**

Two aspects of the Smart Grid may raise new legal privacy issues. First, the Smart Grid significantly expands the amount of data available in more granular form as related to the nature and frequency of energy consumption and creation, thereby opening up more opportunities for general invasion of privacy. Suddenly a much more detailed picture can be obtained about activities within a given dwelling, building, or other property, and the time patterns associated with those activities make it possible to detect the presence of specific types of energy consumption or generation equipment. Granular energy data may even indicate the number of individuals in a dwelling unit, which could also reveal when the dwelling is empty or is occupied by more people than usual. The public sharing of information about a specific location's energy use is also a distinct possibility. For example, a homeowner rigged his washing machine to announce the completion of its cycle via his social networking page so that the machine need not be monitored directly.<sup>17</sup> This raises the concern that persons other than those living within the dwelling but having access to energy data could likewise automate public sharing of private events without the dwellers' consent—a general invasion of privacy.

The concern exists that the prevalence of granular energy data could lead to actions on the part of law enforcement—possibly unlawful in themselves—and lead to an invasion of privacy, such as remote surveillance or inference of individual behavior within dwellings, that could be potentially harmful to the dwelling's residents. Law enforcement agencies have already used monthly electricity consumption data in criminal investigations. For example, in *Kyllo v. United States*,<sup>18</sup> the government relied on monthly electrical utility records to develop its case against a suspected marijuana grower.<sup>19</sup> Government agents issued a subpoena to the suspect's utility to obtain energy usage records and then used a utility-prepared "guide for



estimating appropriate power usage relative to square footage, type of heating and accessories, and the number of people who occupy the residence” to show that the suspect’s power usage was “excessive” and thus “consistent with” a marijuana-growing operation.

As Smart Grid technologies collect more detailed data about households, one concern identified by the privacy group as well as expressed by multiple published comments is that law enforcement officials may become more interested in accessing that data for investigations or to develop cases. For instance, agencies may want to establish or confirm presence at an address at a certain critical time or even establish certain activities within the home —information that may be readily gleaned from Smart Grid data.

However, the Supreme Court in *Kyllo* clearly reaffirmed the heightened Fourth Amendment privacy interest in the home and noted this interest is not outweighed by technology that allows government agents to “see” into the suspect’s home without actually entering the premises.<sup>21</sup> The Court stated, “We think that obtaining by sense-enhancing technology any information regarding the interior of the home that could not otherwise have been obtained without physical intrusion into a constitutionally protected area, constitutes a search” and is “presumptively unreasonable without a warrant . . .

Second, unlike the traditional energy grid, the Smart Grid may be viewed as carrying private and/or confidential electronic communications between utilities and end-users, possibly between utilities and third parties<sup>23</sup>, and between end-users and third parties. Current law both protects private electronic communications and permits government access to real-time and stored communications, as well as communications transactional records, using a variety of legal processes.<sup>24</sup> Moreover, under the Communications Assistance for Law Enforcement Act (CALEA), telecommunications carriers and equipment manufacturers are required to design their systems to enable lawful access to communications.<sup>25</sup> The granular Smart Grid data may also have parallels to call detail records collected by telecommunications providers. It is unclear if laws that regulate government access to communications will also apply to the Smart Grid.

In short, the innovative technologies of the Smart Grid pose new legal issues for privacy of the home, as well as any type of property location that has traditionally received strong Fourth Amendment protection. As Justice Scalia wrote in *Kyllo*: “The question we confront today is what limits there are upon this power of technology to shrink the realm of guaranteed privacy.”

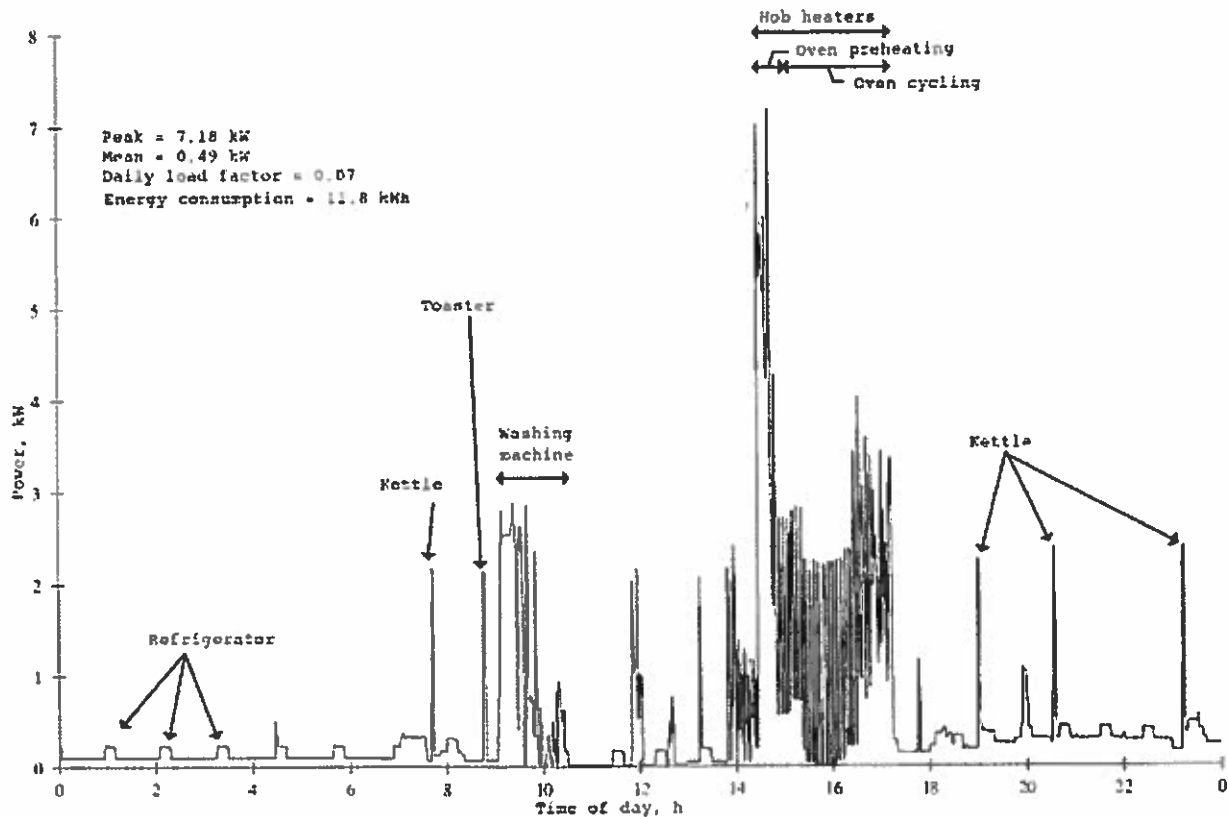
### **5.3.6 Smart Grid Introduces a New Privacy Dimension**

The ability to access, analyze, and respond to much more precise and detailed data from all levels of the electric grid is critical to the major benefits of the Smart Grid—and it is also a significant concern from a privacy viewpoint, especially when this data and data extrapolations are associated with individual consumers or locations. Some articles in the public media have raised serious concerns<sup>27</sup> about the type and amount of billing, usage, appliance, and other related information flowing throughout the various components of the Smart Grid.





There are also concerns across multiple industries about data aggregation of “anonymized” data.<sup>28</sup> For example, in other situations, associating pieces of anonymized data with other publicly available non-anonymous data sets has been shown by various studies to actually reveal specific individuals.<sup>29</sup> Figure 5-1 illustrates how frequent meter readings may provide a detailed timeline of activities occurring inside a metered location and could also lead to knowledge about specific equipment usage or other internal home/business processes.



**Figure 5-1 Power Usage to Personal Activity Mapping**

Smart meter data raises potential surveillance possibilities posing physical, financial, and reputational risks. Because smart meters collect energy usage data at much shorter time intervals than in the past (in 15-minute or sub-15-minute intervals rather than once a month), the information they collect can reveal much more detailed information about the activities within a dwelling or other premises than was available in the past. This is because smart meter data provides information about the usage patterns for individual appliances—which in turn can reveal detailed information about activities within a premise through the use of nonintrusive appliance load monitoring (NALM) techniques.<sup>31</sup> Using NALM, appliances’ energy usage profiles can be compared to libraries of known patterns and matched to identify individual appliances.<sup>32</sup> For example, research shows that analyzing 15-minute interval aggregate household energy consumption data can by itself pinpoint the use of most major home appliances.<sup>33, 34</sup> The graph shown above (Figure 5-1) depicts NALM results as applied to a household’s energy use over a 24-hour period. NALM techniques have many beneficial uses,



including pinpointing loads for purposes of load balancing or increasing energy efficiency.

However, such detailed information about appliance use can also reveal whether a building is occupied or vacant, show residency patterns over time, and reflect intimate details of people's lives and their habits and preferences inside their homes.<sup>35</sup> In 1989, George W. Hart, one of the inventors of NALM, explained the surveillance potential of the technique in an article in IEEE Technology and Society Magazine.<sup>36</sup> As the time intervals between smart meter data collection points decreases, appliance use will be inferable from overall utility usage data and other Smart Grid data with even greater accuracy.

In general, more data, and more detailed data, may be collected, generated, and aggregated through Smart Grid operations than previously collected through monthly meter readings and distribution grid operations. Figure 5-2 presents the NIST conceptual model illustrating how data collection can be expected to proliferate as networked grid components increase. In addition to utilities, new entities may also seek to collect, access, and use smart meter data (e.g., vendors creating applications and services specifically for smart appliances, smart meters, and other building-based solutions). Further, once uniquely identifiable "smart" appliances are in use, they will communicate even more specific information directly to utilities, consumers, and other entities, thus adding to the detailed picture of activity within a premise that NALM can provide.



There are at least two good (for the smart meter mfr) reasons why the spark gaps were eliminated. First, is pragmatic in that a plasma discharge in the immediate proximity of sensitive electronic equipment can either damage such or make it loose its memory (both data and or program). A plasma discharge (spark) generates high power electromagnetic noise over a wide frequency spectrum and often causes unpredictable interference. I know and understand such because I am a retired electronic power controls engineer and have struggled with this issue for my entire career.

The second involves agency approvals. While a spark gap can be approved, the typical spark gap found in legacy meters are of an empirical design that simply works, but avoids classic spark gap design rules—an approved spark gap would take hundreds of thousands of dollars to get tested and approved by UL or other independent testing house, and would not fit in the footprint of the existing meter. Although the empirical spark gap design may be somewhat deficient in energy handling capacity, the synergistic effect of thousands of grid-connected spark gaps (all legacy meters) can not be underestimated—they simply have been proven to be very effective.

The bottom line is that the consumer is left holding the bag when it comes to lighting or surge damage to structures and appliances—neither the manufacture nor the utility accepts responsibility.....and certainly not the ~~PUC~~ that was originally established to protect the consumer.

*MASC Section 460.62*

The obvious solution is to bring back the legacy meter!



## ii. Fourth Amendment Jurisprudence

Other authors—most notably Jack Lerner and Deirdre Mulligan—have dealt squarely with Fourth Amendment concerns related to advanced metering infrastructure and high-resolution energy usage information.<sup>92</sup> The lessons of their investigation should, however, be kept in mind—namely, that interval data of electricity consumption appears to be in something of a no-man’s-land under Supreme Court Fourth Amendment jurisprudence. On the one hand, the Court has upheld the sanctity of the home as the touchstone for privacy protection.<sup>93</sup> Technology that effectively pierces the blinds, exposing information about activities inside the home requires a warrant before it is employed. It would appear that electricity usage data, as it contains many intimate details about the in-home activities of consumers, allows investigators to see through walls into the home and so access to the information should be restricted to essentially a need-to-know basis.<sup>94</sup>

On the other hand, business records collected and kept by third parties enjoy far fewer privacy protections, the underlying theory being that consumers elected to transact with the business, and to engage in activities open to observation by the public.<sup>95</sup> Traditional electricity metering information has generally been treated as business records and so lies unprotected by the Fourth Amendment.<sup>96</sup> Though Lerner and Mulligan seem optimistic that courts will “take the long view” on Fourth Amendment protections and extend them to smart metering data, my own analysis is that the law as it stands does not decide the matter, and the jurisprudence could easily be used to justify either result.

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<sup>92</sup> The instant discussion is meant merely to bring out some of the issues and not provide a comprehensive treatment of these concerns. For a more comprehensive treatment, see Jack I. Lerner & Deirdre K. Mulligan, *Taking the “Long View” on the Fourth Amendment: Stored Records and the Sanctity of the Home*, 2008 STAN. TECH. L. REV. ¶¶ 7–8, 11–30, available at <http://stlr.stanford.edu/pdf/lerner-mulligan-long-view.pdf>.

<sup>93</sup> See *id.* ¶¶ 14, 18 (discussing *Kyllo v. United States*, 533 U.S. 27, 37–40 (2001), a case in which the Supreme Court ruled law enforcement’s use of thermal imaging without a warrant to spot areas of relative heat within a residence, areas later discovered to be used for growing marijuana).





# DTE shuts off power to 92-year-old woman's home because of battle over smart meter

**POSTED:** 10:53 PM, Sep 17, 2015

**UPDATED:** 10:25 AM, Sep 18, 2015

Share Article

LINCOLN PARK, Mich. (WXYZ) - An elderly Lincoln Park woman is involved in a showdown with DTE over the meter at her house.

The utility company shut off Olga Puste's power the day after her 92nd birthday, because she installed a lock on her meter. DTE wants to install a smart meter, which Puste says is against her beliefs.

Puste is a long time naturopath and avoids things like conventional medicine and vaccines.

While she does have the option to pay \$10 a month to opt out of a smart meter, DTE would still install a digital meter on her home. Digital meters are also against her beliefs as a naturopath.

DTE says they warned Puste four times before shutting off the power. They released the following statement about the situation:

*With the device still in place today, after multiple notifications, DTE had to act in the best interest of the customer and the community by turning off her power. DTE's action were taken to ensure the safety of all its customers and their communities, especially those who may have unknowingly made decisions that pose a danger to themselves and their neighbors.*

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# **Module 8:**

# **EMC Regulations**

## **Introduction**

The goal of electromagnetic compatibility, or EMC, is to design electronic systems that are electromagnetically compatible with their environment. EMC requirements exist so that electronic systems designers have a set of guidelines that explain the limits of what is considered electromagnetically compatible. There is not, however, one all-encompassing set of EMC guidelines. Instead, EMC guidelines are created by individual product manufacturers, and by the government. Requirements set forth by the government are legal requirements that products must meet, while the requirements set forth by the manufacturer are self-imposed and often more stringent than those set forth by the government.

## **Government Requirements**

Not all countries have the same EMC requirements. In fact, each country is responsible to enforce their own set of requirements. This does not, however, mean that each country has a unique set of EMC requirements. In fact, the various EMC requirements set forth by all the countries of the world are very similar, and many countries are moving toward accepting an international standard for EMC requirements known as the CISPR 22 standards. These standards have been adopted throughout much of Europe and were developed in 1985 by CISPR (the French translation meaning International Special Committee on Radio Interference).

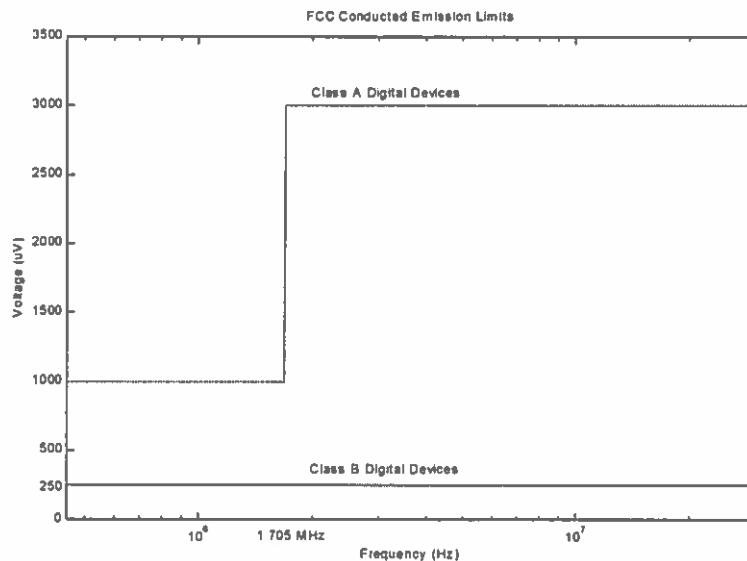
In the United States the Federal Communications Commission (FCC) is charged with the regulation of radio and wire communication. Radio frequency devices are the primary concern in EMC. A radio frequency device is defined by the FCC as any device that is capable of emitting radio frequency energy by radiation, conduction or other means whether intentionally or not. Radio frequencies are defined by the FCC to be the range of frequencies extending from 9 kHz to 3000 GHz. Some examples of radio frequency devices are digital computers whose clock signals generate radiated emissions, blenders that have dc motors where arcing at the brushes generates energy in this frequency range, and televisions that employ digital circuitry. In fact nearly all digital devices are considered radio frequency devices.

With the advent of computers and other digital devices becoming popular, the FCC realized that it was necessary to impose limits on the electromagnetic emissions of these devices in order to minimize the potential that they would interfere with radio and wire communications. As a result the FCC set limits on the radiated and conducted emissions of digital devices. Digital devices are defined by the FCC as any unintentional radiator (device or system) that generates and uses timing pulses at a rate in excess of 9000 pulses (cycles) per second and uses digital techniques... . All electronic devices with digital circuitry and a clock signal in excess of 9 kHz are covered under this rule, although there are a few exceptions.

The law makes it illegal to market digital devices that have not had their conducted and radiated emissions measured and verified to be within the limits set for by the FCC regulations. This means that digital devices that have not been measured to pass the requirements can not be sold, marketed, shipped, or even be offered for sale. Although the

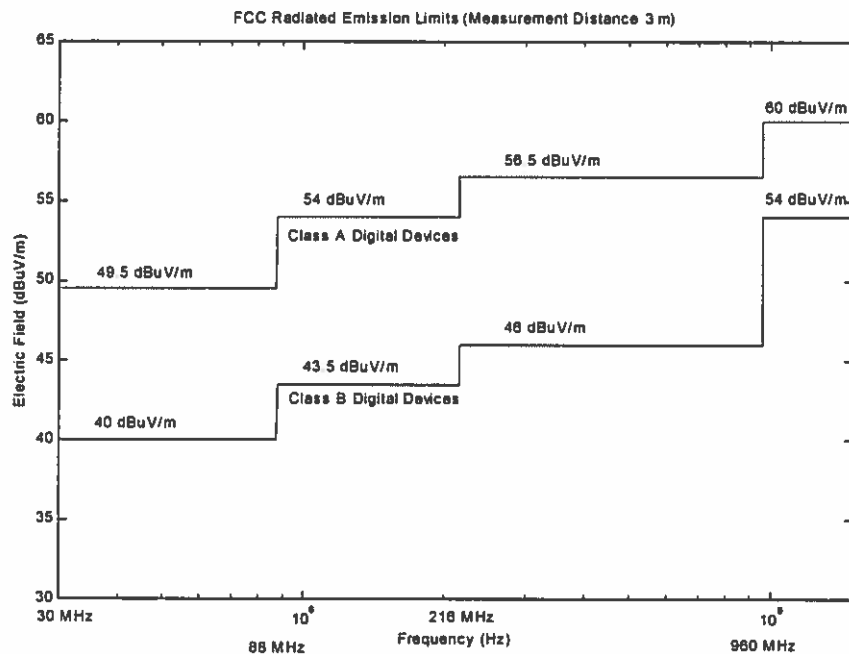
penalties for violating these regulations include fines and or jail time, companies are more concerned with the negative publicity that would ensue once it became known that they had marketed a product that fails to meet FCC regulations. Furthermore, if the product in question were already made available to the public, the company would be forced to recall the product. Thus it is important that every unit that a company produces is FCC compliant. Although the FCC does not test each and every module, they do perform random tests on products and if a single unit fails to comply, the entire product line can be recalled.

The FCC has different sets of regulations for different types of digital devices. Devices that are marketed for use in commercial, industrial or business environments are classified as Class A digital devices. Devices that are marketed for use in residential environments, notwithstanding their use in commercial, industrial, or business environments are classified as Class B digital devices. In general the regulations for Class B devices are more stringent than those for Class A devices. This is because in general digital devices are in closer proximity in residential environments, and the owners of the devices are less likely to have the abilities and or resources to correct potential problems. The following table shows a comparison of the Class A and Class B conducted emissions limits, where you can clearly see that the regulation for Class B devices are more strict than those for Class A devices. A comparison for radiated emissions will be shown later. Personal computers are a subcategory of Class B devices and are regulated more strictly than other digital devices. Computer manufacturers must test their devices and submit their test results to the FCC. No other digital devices require that test data be sent to the FCC, rather the manufacturer is expected to test their own devices to be sure they are electromagnetically compatible and the FCC will police the industry through testing of random product samples.



Since the FCC regulations are concerned with radiated and conducted emissions of digital products, it is useful to understand what these emissions are. Conducted emissions are the currents that are passed out through the unit's AC power cord and placed on the common power net. Conducted emissions are undesirable because once these currents are onto the building wiring they radiate very efficiently as the network of wires acts like a large antenna. The frequency range of conducted emissions extends from 450 kHz to 30 MHz. Devices are tested for compliance with conducted emissions regulations by inserting a line impedance stabilization network (LISN) into the unit's AC power cord. Current passes through the AC power line and into the LISN, which measures the interference current and outputs a voltage for measurement purposes. The actual FCC regulations set limits on these output voltages from the LISN even though the current is what is truly being regulated. Radiated emissions are the electric and magnetic fields radiated by the device that may be received by other devices, and cause interference in those devices. Although radiated emissions are both electric and magnetic fields, the FCC and other regulatory agencies only require that electric fields be measured for certification. The magnitudes of these fields are measured in dB $\mu$ V/m and the frequency range for radiated emissions extends from 30 MHz to 40 GHz. Radiated field measurements for FCC compliance are done in either a semianechoic chamber or at an open field test site. The product under test must be rotated so that the maximum radiation will be achieved and measurements must be made both with the measurement antenna in vertical and horizontal polarizations with respect to the ground plane.

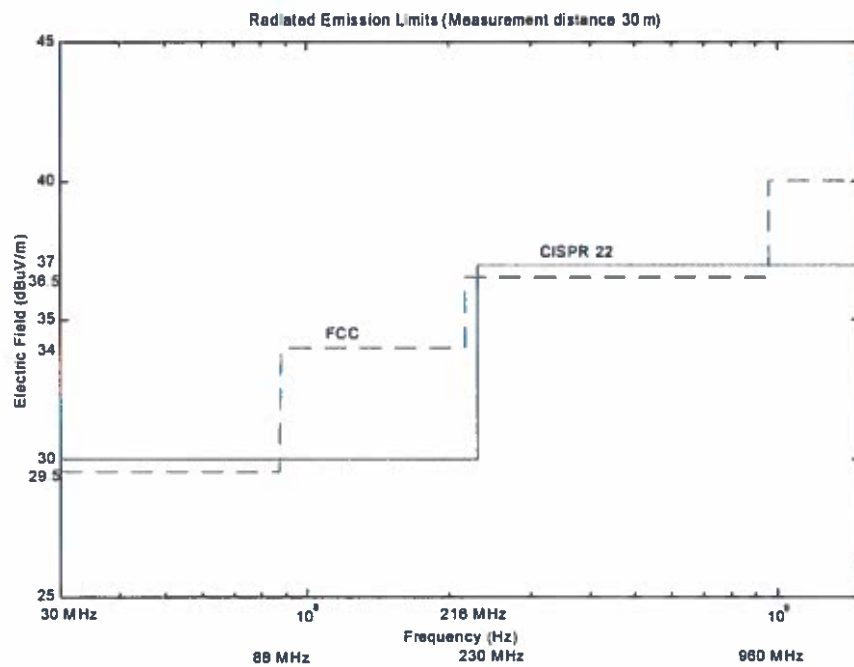
The method for measuring radiated emissions varies depending on the type of device being measured. Class A digital devices must be measured at a distance of 10 m from the product and Class B devices are to be measured at a distance of 3 m from the product. As explained earlier, the Class B devices, which are marketed for residential use, have stricter regulations and thus must be measured in closer proximity than Class A devices. The following graph displays the radiated emission limits that are defined by the FCC for Class A and Class B digital devices. Because the measurement distances defined by the two requirements are different, we must scale the measurement distances so that they are both at the same distances in order to achieve an accurate comparison. One way to do this is with the inverse distance method, which assumes that emissions fall off linearly with increasing distance to the measurement antenna. Thus emissions at 3 m are assumed to be reduced by 3/10 if the antenna is moved out to a distance of 10 m. So, to translate Class A limits from a distance of 10 m to 3 m, we add  $20\log_{10}(3/10) = 10.46$  dB to the Class A limits. This approximation is only valid, however, if the measurements are taken in the far field of the emitter. We can assume that the far field boundary is three wavelengths from the emitter, and with the radiated emissions frequency range defined as 30 MHz to 40 GHz, the maximum distance from the emitter that the measurements will be in the far field is 30 m. Thus, at 10 m not all measurements will be in the far field. At 10 m frequencies of 90 MHz and higher will be in the far zone. So, for the case of this plot, the inverse distance method can be assumed to be accurate for frequencies above 90 MHz, but begins to break down at lower frequencies. However, this comparison still nicely demonstrated how Class B limits tend to be roughly 10 dB more strict than Class A radiated emission requirements.



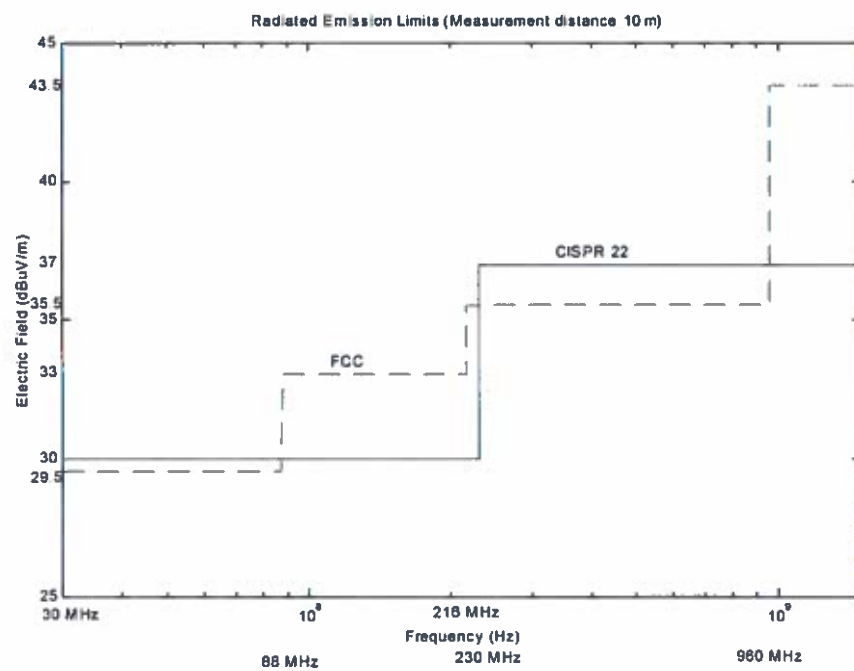
Internationally EMC requirements differ from those in the United States. As discussed earlier, each country is responsible for its own set of EMC regulations. Since the CISPR 22 regulations have been adopted by several countries we will examine them and compare them to the FCC regulations in the United States. CISPR 22 regulations require that radiated emissions measurements for Class A devices be measured at a distance of 30 m and Class B devices be measured at a distance of 10 m. Again using the inverse distance method, we can scale the measurement limits to a common distance and plot the CISPR 22 and FCC regulations together to compare them. As you can see, although the regulations vary slightly in different frequency ranges, there isn't much difference between the FCC and CISPR 22 regulations for radiated emissions.

#### Radiated Emissions Limits for Class A Digital Devices

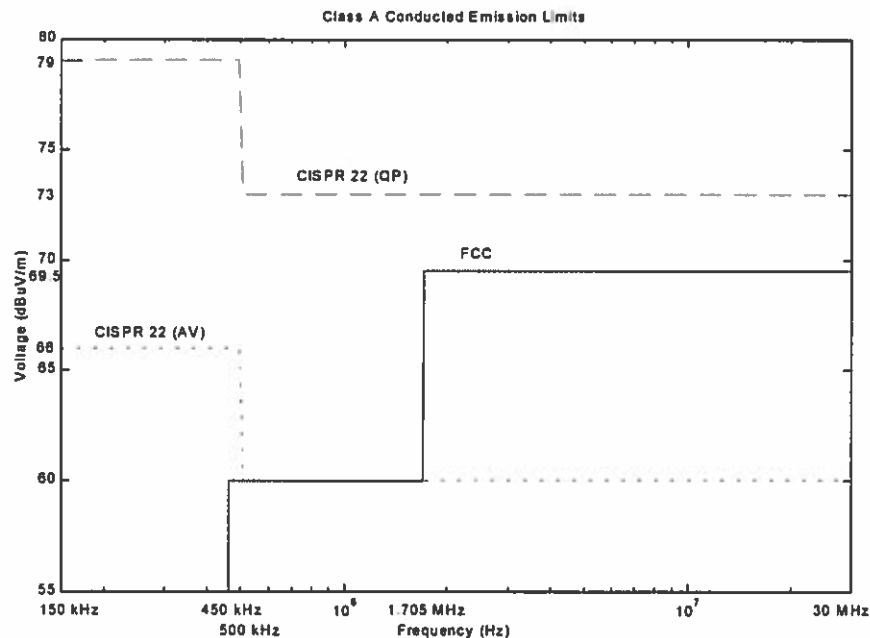


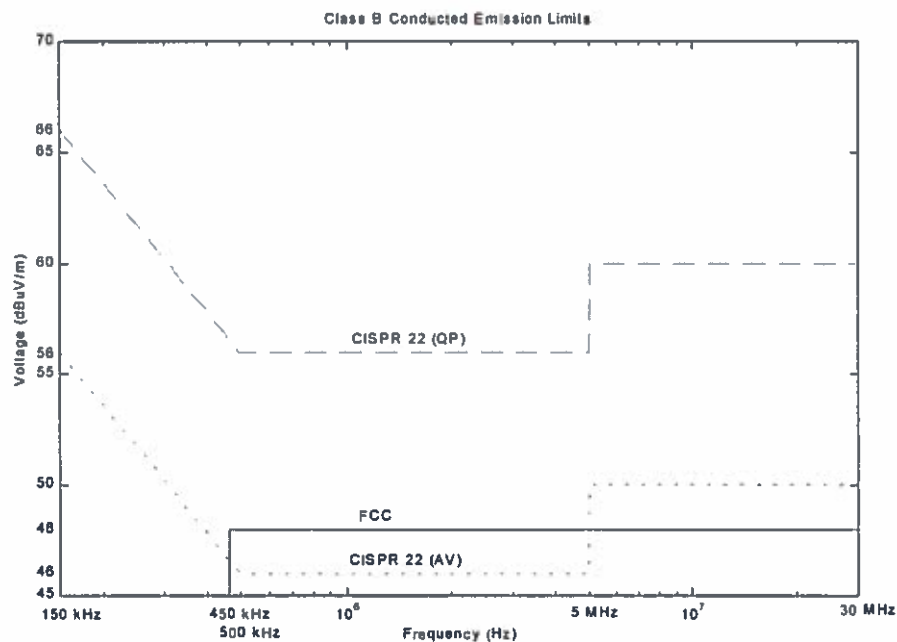


### Radiated Emissions Limits for Class B Digital Devices



The differences in the FCC and CISPR 22 regulations become much more obvious when looking at the conducted emissions limits. The most notable difference is the frequency range that is regulated for conducted emissions. While they both have a maximum frequency of 30 MHz, the CISPR 22 regulations extend down to 150 kHz, while the FCC regulations only extend down to 450 kHz. You can see that the CISPR 22 limit for class B devices rises for frequencies below 500 kHz. This extension was put in place to cover the emissions of switching power supplies, which are growing in importance over linear power supplies due to their efficiency and light weight. Another difference is that the CISPR 22 regulations for conducted emissions are given for when the receiver uses a quasi-peak detector (QP) and when the receiver uses an average detector (AV). FCC conducted emissions limits and CISPR 22 and FCC conducted emissions limits all apply to the use of a quasi-peak detector.



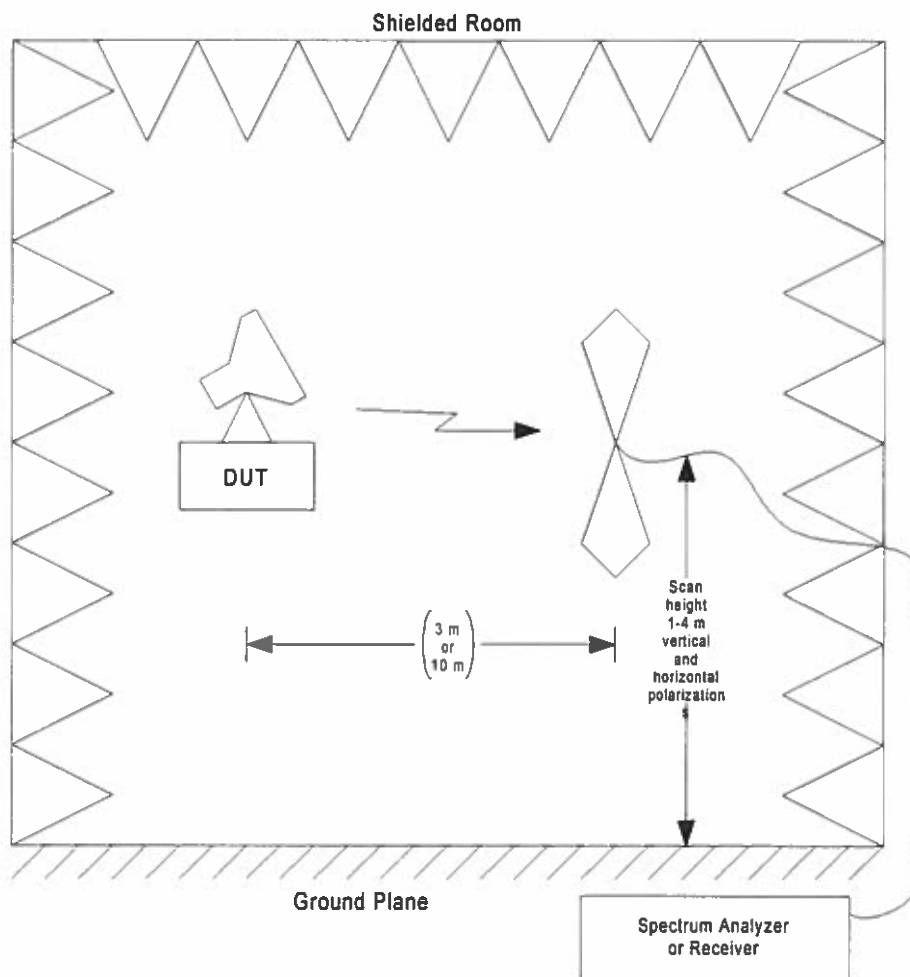


Military EMC regulations also exist. As you would expect, EMC issues are very important in military applications so that missions will not be compromised. Along with conducted and radiated emissions, the military also regulates susceptibility. This is very important in military applications, as it is vital that military equipment is immune to outside interference. The military is more strict in its regulations than the FCC or CISPR and it also has a much larger frequency range that is regulated and has several subdivisions within that frequency range. Additionally, the military may deem to have the EMC requirements waived for certain applications if it is judged that it is necessary to mission success. CISPR and FCC regulations cannot be waived for commercial products.

### Measuring Radiated Emissions

In order to ensure that testing for radiated emissions are accurate, the FCC and CISPR have testing standards that explain how testing must be done. This ensures that the testing is accurate and repeatable. For radiated emissions the FCC specifies that the measurements of radiated and conducted emissions must be performed on the complete system. All interconnect cables to peripheral equipment must be connected and the system must be in a typical configuration. The cables and the system must also be configured in a representative way such that the emissions are maximized. For instance, a unit with interior wire harnesses must have the harnesses configured in such that for all possible ways the unit can be assembled with those wire harnesses, the way with the most radiated emissions must be tested. This ensures that for mass production of a unit, the worst case scenario is taken into consideration.

The testing standards set forth by the FCC for radiated emissions testing are very specific and difficult to automate. Radiated emissions are to be measured at a distance of 10 m for Class A devices and at a distance of 3 m for Class B devices. These measurements are to be made over a ground plane using a tuned dipole antenna at an open field test site. Additionally, the tests are to be made with the measurement antenna in both the vertical and horizontal positions. During development of products, however, most companies test their products in a semianechoic chamber, which is a shielded room with radio frequency absorbing cones on the walls and ceiling. This semianechoic chamber simulates an open field test site, and eliminates any ambient signals that may be present in an open field environment. An example of this setup can be seen in the following figure.



Another way that companies simplify the FCC test procedure is by using a broadband antenna such as a log-periodic or discone antenna. Such antennas are desirable since,

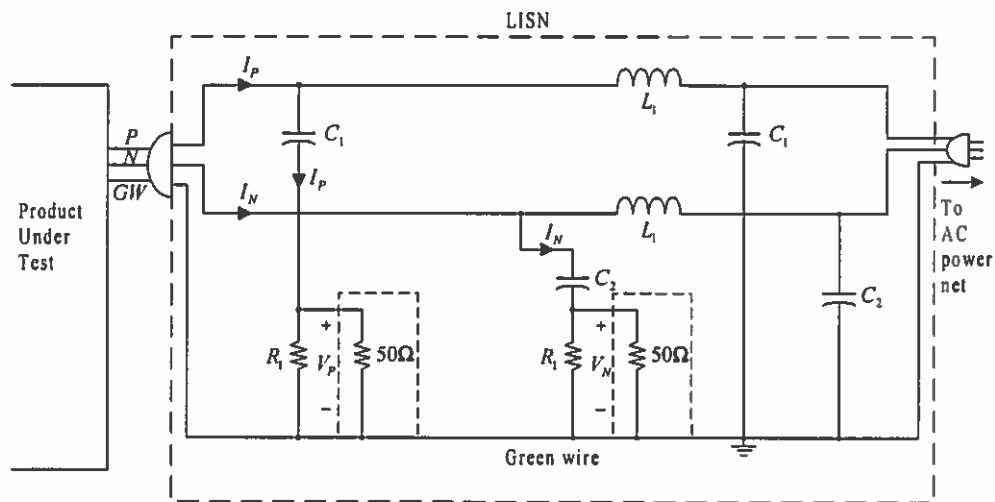
unlike a tuned dipole, their length does not need to be adjusted with each frequency change. This allows companies to test their products using a frequency sweep rather than having to do each frequency separately and adjusting the dipole lengths with each measurement.

One last test requirement for radiated emissions testing is the bandwidth of the receiver being used to measure the signal must be at least 100 kHz. By having such a large bandwidth, the test will not pick up intended narrowband signals such as clock signals, but it will detect emissions from broadband sources such as the arcing at the brushes of a dc motor. A related issue is the detector used in the output stage of the receiver. Although typical spectrum analyzers use peak detectors, the FCC and CISPR test procedures require that the receiver use a quasi-peak detector. This ensures that fast changing, momentary signals such as randomly occurring spikes will not charge up the quasi-peak detector to as high a level as periodic signals. After all, the FCC is not concerned with randomly occurring one time signals. Rather, they are concerned with more significant and frequent emissions that would cause interference with radio and wire communications.

### **Measurement Requirements for Conducted Emissions**

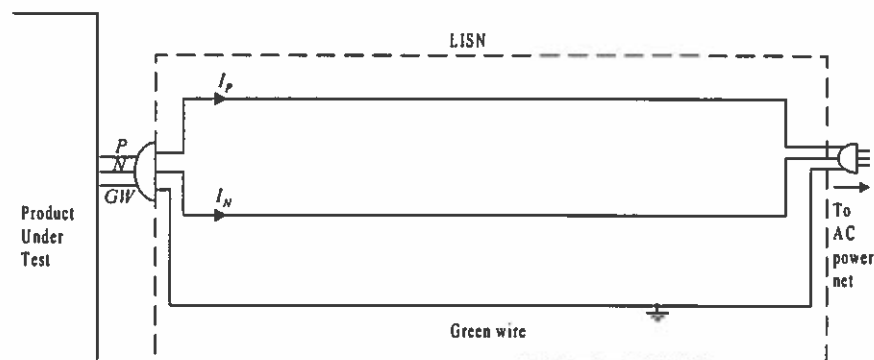
The intent of conducted emissions limits is to prevent noise currents from passing out through the AC power cord of the device onto the common power net of the installation. The common power net of an installation is an array of interconnected wires in the installation walls, and can be seen as a large antenna. Noise currents placed onto the common power net will consequently radiate very efficiently. An example of this is the interference that occurs on your television or radio when you use the blender. The arcing of the brushes of the dc motor in the blender causes noise currents that pass out through the power cord of the blender and into the common power net of your house. The wiring in the house acts as an antenna and radiates the noise, which is picked up as interference in your television and radio.

Therefore, conducted emissions are concerned with the current that is passed out through the power cord of the device. However, the FCC and CISPR 22 conducted emission limits are given in units of volts. This is because the LISN, which is used to measure conducted emissions converts the noise currents to voltage. In order to understand the function of the LISN it is important to understand the standard ac power distribution system. In the United States, AC voltage used in residential and business environments has a frequency of 60 Hz and an RMS voltage of 120 V. The power wires in a home consist of 3 wires, a phase wire, a neutral wire, and the green wire. Both the phase and neutral wires carry the 60 Hz power and the potential between each wire and ground is 120 V. The currents that need to be measured for conducted emissions tests are the currents that occur on the phase and neutral wires.

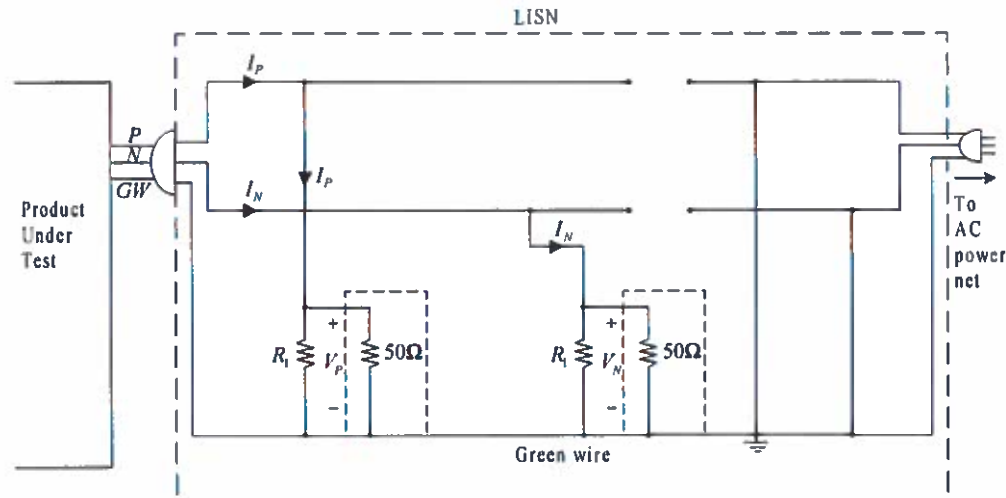


The above figure shows the LISN used for FCC conducted emissions tests. A similar LISN is used for CISPR 22 conducted emissions testing, but the component values are different due to the different frequency range defined by CISPR for conducted emissions testing. The LISN has two functions. The first function is to isolate external noise from the common ac net from contaminating the measurement. The second purpose of the LISN is to present a constant impedance in frequency from site to site to the product between phase and ground and between neutral and ground.

Following is an explanation of how the LISN works. First, one of the  $50\ \Omega$  resistors represents the input impedance of the spectrum analyzer, and the other  $50\ \Omega$  resistor is a dummy load. The capacitors  $C_1 = 0.1\ \mu\text{F}$  is in place to prevent any dc from overloading the test receiver and the resistors  $R_1 = 1\text{k}\Omega$  are in place to provide a path an path for  $C_1$  to discharge in the event the  $50\ \Omega$  resistors are disconnected. The product under test should operate normally at 60 Hz power frequencies. Thus, at 60 Hz the capacitors will look like open circuits and the inductors will look like short circuits, and the equivalent circuit will look like this:



Thus the product under test will operate as if there were nothing between it and the ac power net at 60 Hz. In the frequency range of conducted emissions (450 kHz-30 MHz), however, the conductors will look like short circuits and the inductors will look like open circuits. The equivalent circuit will look like this:



Thus, the currents on the neutral and phase lines can be isolated and measured at the  $50\Omega$  resistors. Notice that the currents on the phase and neutral lines have **no** path that they can get onto the ac power net with.

### Additional Product Requirements

As stated earlier, the FCC and CISPR 22 regulations are requirements set forth by law to regulate digital devices. Individual companies, however, self impose their own set of regulations on their products, which are often much more stringent than the required regulations. The automobile industry, for example is exempt from FCC requirements, yet their self-imposed regulations far exceed those that the FCC sets forth for normal digital devices. This is because companies stand to lose far more money as a result of a faulty or poorly designed product, than they would by investing to make sure their product is safe and well designed. After all, people put their lives in the hands of auto manufacturers every time they drive a vehicle, and auto manufacturers cannot afford to have lax standards.

Aside from imposing stricter versions of government regulations on themselves, many companies also impose design constraints on their products that protect against, radiated immunity, conducted immunity, and electrostatic discharge (ESD). The FCC does not regulate these areas because they do not pose a threat to radio or wire communications, so individual manufacturers are left to create their own standards. Furthermore, as each of

these categories pertains to a products ability to function despite outside interference, they are of the utmost importance for manufacturers to guard against. Radiated immunity is a products ability to operate in the face of high power transmitters, such as AM and FM transmitters and airport surveillance radars. Manufacturers test their products by illuminating their product with typical waveforms and signal strengths that simulate worst case exposure that the product could encounter. Conducted immunity is the ability of a product to operate despite a variety of interferences that enter the device via the ac power cord. An obvious example of such interference would be a power surge caused by lightning strike. Manufacturers must design tests that would simulate the effect of lightning induced transients and design their product to resist such interference accordingly. Electrostatic discharge is when static charge builds up on the human body or furniture and is subsequently discharged to the product when the person or furniture comes in contact with the product. Such static voltage can approach 25 kV in magnitude. When the discharge through the product occurs, large currents momentarily coarse through the product. These currents can cause machines to reset, IC memories to clear, etc. Manufacturers test their products by subjecting them to controlled ESD events and design their product to operate successfully in the event of such ESD occurrences.

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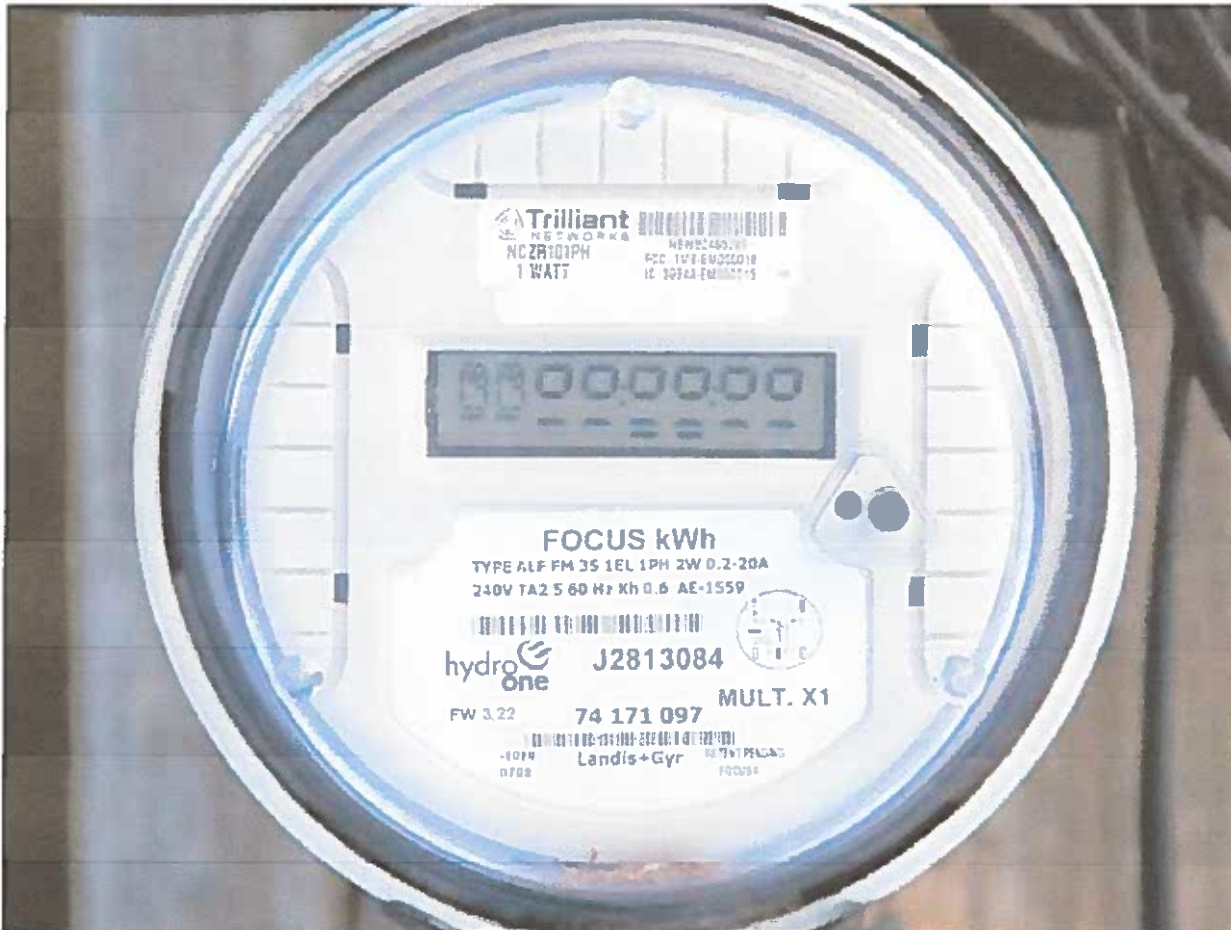


# **‘Astonishing’: Hydro One pulling plug on 36,000 rural smart meters after years of complaints**

NP

KELLY EGAN, POSTMEDIA NEWS | January 13, 2016 11:32 AM ET

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Postmedia Network filesThe introduction of smart meters to Ontario, mandated by the Liberal government at a cost of about \$2 billion, created peak and off-peak rates that were to spark a conservation drive across the province. The results have been disappointing.

Hydro One has taken a new approach to pesky smart meters that refuse to send a reliable signal about electricity consumption in rural Ontario.

Give up on them.

The utility, which was ordered by its provincial masters to install the devices, admits it has decided to manually read roughly 36,000 meters instead of counting on the wireless technology.

“Astonishing,” was the reaction from Lanark-area MPP Randy Hillier, who has been deluged with complaints about Hydro One billing and smart-meter suspicions.



“I’ve been banging my head against the wall for the last five years, saying we’ve got problems with smart meters in rural Ontario.” Since first being elected in 2007, no single issue has attracted as much attention in his riding, he said.

One of the main complaints, Hillier explained, is that the terrain in rural Ontario is such that the wireless meters — which send out a continuous signal to permit time-of-use billing — frequently fail. Turns out it’s absolutely true.

“The evidence has been in front of us for a long time. It doesn’t work, it hasn’t worked and now (there’s) an admission that it will never work.”



Wayne Cuddington / Ottawa CitizenCattle farmer Nancy Zwarts in 2013. Her new smart meter wasn't transmitting data to the utility.

His conclusion is based on a letter from Hydro One being sent to a number of residents outside Perth in eastern Ontario, including a handful on Barries Sideroad, about five kilometres north of town.

One was dated Dec. 25, which caused Hillier to wonder whether the utility was now employing elves or festive-resistant computers. But that’s another story.

Here’s a portion: “Over the last few years, we’ve learned that it isn’t possible to economically connect all meters to the smart meter network. Nor is it possible to make all meters communicate reliably enough to issue regular time-of-use (TOU) bills based on actual meter readings.”

So the customer was told Hydro One was moving her to the so-called “two-tier” system, which charges a lower rate for the first block of kilowatt hours, then a higher amount above this threshold. The meter will be read quarterly and bills in between will be based on estimates.



Hillier is pleased with the change. Malfunctioning meters were among several issues that caused a customer relations nightmare for Hydro One in 2013 and 2014.

So much for trying to get people to use off-peak mostly! They basically admit that they cannot make the smart meters work outside of populated areas

When Hydro moved to a new billing system, it was buried with complaints, numbering in the tens of thousands. Some customers were double and triple billed; some had no bills for months; others were comically billed millions in overcharges.

When Ontario's ombudsman stepped in, the office of André Marin was flooded with more than 10,000 complaints. Hydro admitted its errors, even sending about a million letters of apology to its customers.

The introduction of smart meters to Ontario, mandated by the Liberal government at a cost of about \$2 billion, created peak and off-peak rates that were to spark a conservation drive across the province. The results have been disappointing.

Related

- [Kelly McParland: Ontario Liberals are peddling Hydro One for the equivalent of a payday loan](#)

"So much for trying to get people to use off-peak mostly!" wrote Barries Sideroad resident Gregory Jaques, who also received a Hydro letter about manually readings. "They basically admit that they cannot make the smart meters work outside of populated areas."

To make things more curious, Jaques reports that Hydro only weeks ago installed a repeater on an area pole to boost the signal from the meters. It was working fine, he said, when Hydro announced it was abandoning the plan.

"It's a waste of money, from someone's point of view."

Hydro One, meanwhile, says it knew it had a problem on its hands in rural areas and successfully applied to the Ontario Energy Board to switch from TOU meters to manual readings. The board approved the change in March 2015.

Some rural customers were baffled by the technological problems. It was especially laughable when Hydro responded that leafy trees could interrupt the signal, as though the presence of trees in the countryside came as a surprise. At the height of the crisis, Hydro said about six per cent of its one million customers were having "billing issues."

Hillier only shakes his head at the countless hours customers have spent with Hydro's call centre, the frustration of trying to be heard and the repeated errors that, in some cases, have threatened financial ruin on small businesses. And, now, to pull the plug on the meters altogether?

"Anytime a government agency doesn't cause stress or anxiety is an improvement."





## ONTARIO PULLS PLUG ON 36,000 RURAL 'SMART' METERS: IS BIG ENERGY IMPLODING?

JOSH DEL SOL JANUARY 20, 2016



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Last night I watched *The Big Short* — maybe the most important Hollywood film in years. This true story is a powerful and eloquent invitation to wake up to the sheer depravity at the core of the system of commerce.

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The fact that the film got nominated for 5 Oscars including Best Picture is a huge sign that there are way more people waking up than we ever thought. The wrongs may not be getting righted as quickly as we'd like, but it is happening.

The reality of this shift is clearly evidenced by this news last week from Ontario. After years of obvious problems, Hydro One finally **admitted that rural 'smart' meters do not work**, and has decided to pull the plug on 36,000 of them — to start. We will see more utilities begin to do likewise. [UPDATE: BC Hydro just **announced plans to remove 88,000 meters suspected of failure.**]

Costing ratepayers billions, smart meters are actually designed to unlawfully harvest detailed data of the in-home activities of occupants without their knowledge or consent.

As reported by the *National Post*:

*"Astonishing," was the reaction from Lanark-area MPP Randy Hillier, who has been deluged with complaints about Hydro One billing and smart-meter suspicions.*





My name is Jaime Chimner from Cheboygan, Michigan near the Mackinaw Bridge. I am Permanently Disabled.

From 2009 to August 2015 I had a (supposedly non transmitting) digital opt out meter on my house and I was unaware of it. On August 2015 my husband Joe cut the main breaker on the house. Why? You may ask. My health, and his, had deteriorated soon after moving into his home in 2009. I went from a cane to a walker to a wheelchair and homebound by 2015. I was paralyzed from the waist down most days and in such severe sharp pain through out my body continuously at its worse from 2013 to August 20, 2015. I wanted to die. That next morning after he shut off the breaker I could walk! My pain level was greatly reduced and I was laughing! My husband, and friend and Doctors were in shock.

4 of my Doctors wrote letters stating I needed an analog meter on my house for my health or I could die. On August 20, 2015 Joe immediately ordered an Analog meter and he put it on the house August 26, 2015. I could finally live in my house without a headache, buzzing in my head and body, muscle spasms, jerk movements, blindness, anxious. I have muscle damage throughout my body now and I am Electricalmagnetic Hypersensitive now as well as other sensitivities. That digital meter intensified what medical issues I may have had and added others. No one will help us!

Consumers Energy wouldn't work with us. **They cut our power on Sept. 11, 2015 because I refused the digital meter back on my house.** Mr. Dennis McKee from Consumers Energy cut our power at 2 pm sept. 11, 2015. We are going through our second winter without electric and I am permanently disabled. So we could survive we had to take out a loan to get natural gas radiating heaters, batteries so we could recharge for LED strip lighting, a generator we didn't have and the gas for it, how were we going to keep our chickens and ducks warm in the winter.. We couldn't afford that. I have medical devices that need electricity to work. My health has improved 10 fold since that digital meter was taken off our home but I was left with worsened asthma, the need for my breathing machine, my special air cleaners and other machines I need. But we still have no electricity and Consumers has decided we don't exist,,,,,unless I take a digital meter on my house.

That digital meter was from 2006, the first year they put in the switch mode power supply. That is the main problem with the smart meters and digital meters. The analog meter has surge arresters and digital meters don't and the smart meters aren't UL approved or ANY independent approval. It is harmful to your health, I AM THE EVIDENCE as are many more people here. But no one will help us.

Part of the solution is to hardwire computers, hardwire your phone, DTE opted us out of the new gas meter and we didn't even have to ask, ATT hardwired our phone no problem, the local water company opted us out of the smart water meter, they didn't want to subject us to that also. Now where is the problem with Consumers?? As so many people tell us-they can't believe we still don't have electricity and what was Consumers problem? I ask myself that daily.

We DESPERATELY need METER CHOICE in order for any chance of electricity with a mechanical analog meter. Please support this bill.

I am so grateful to have most of my life back but we feel punished. Joe wanted to find the reason for my decline and he was afraid I couldn't hold on any longer. It seems a man gets punished for saving his wife's life.

Please help us.

Respectfully

*Jaime Chimner*  
2/20/2017



**From:** d daxx <djdax17@hotmail.com>  
**Sent:** Saturday, February 18, 2017 6:15 PM  
**To:** Kevin Gawronski  
**Subject:** "smart"??meters

Greetings, my name is Donald Fleming and I live in Novi, MI. In 2005 I was driving in Monroe and experienced a feeling of cold, light-headedness, and I feared that I would pass out. I recovered and that week I saw my Doctor, Doctor Robert K. Brateman from Novi, and he recommended seeing a Specialist. I did and was told that I experienced a transischemic attack (sp?). After attending a meeting, without any preceding connection, I learned about smart meters. Within three (3) days after the first experience, and many such experiences after, I was rushed to the hospital to the emergency and an on-demand pacemaker was determined to be a solution. When you consider that I was having at least a dozen such experiences daily, and was notified that they were precursors to a heart attack, I became very concerned. It was only later that I discovered that DTE has installed such a meter three (3) days before the initial attack. As I stated above I kept experiencing similar attacks so I wrapped the meter with a thickness of aluminum and have not had any similar experiences.

A precursor to a heart attack does not justify the DTE explanation that they are harmless. Sincerely, Donald J. Fleming, djdax17@hotmail.com, Novi, MI.

PS There are many European reports that completely explain how dangerous said "smart" meters are!

*"Don't believe everything you think. Thoughts are just that - thoughts." - Allan Lokos*

A democratic government that respects no limits on its own power is a ticking time bomb, waiting to destroy the rights it was created to protect.

??? James Bovard, *Attention Deficit Democracy*  
[2006]

**Kevin Gawronski**

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**From:** Tara McKnight <tara.l.mcknight@gmail.com>  
**Sent:** Sunday, February 19, 2017 7:40 AM  
**To:** Kevin Gawronski  
**Subject:** House Bill 4220

I am writing in hopes that bill 4220 is written to allow analog meters to stay on homes. It is imperative for my health that this choice is an option for me.

Thank you for all the hard work you are doing! Thank you for being brave enough to stand up for the common people.

Tara mcknight

Sent from my iPhone



**From:** Frances Sterling <presence1st@gmail.com>  
**Sent:** Sunday, February 19, 2017 9:41 AM  
**To:** Kevin Gawronski  
**Subject:** Digital vs. Analog meter on my home

Sir,

Re House Bill 4220

I will be out of town until March 10th and unable to attend the hearings. I would appreciate my voice being heard.

I am a retired Chiropractor and ex-Managing Partner of Earthcalm, a company who assists thousands in their regaining or maintaining their health due to electrical sensitivity. I have seen first hand how health has declined in many while technology has advanced. Yes they are a small percentage of the population, however independent study has shown everyone is affected whether they are currently exhibiting symptoms or not. As an analogy, did we know decades ago that childhood obesity would be on an alarming rise as it is today when sugary cereals, drinks and processed foods were introduced?

The human body has an incredible ability to adapt and survive until the tipping point. We have reached that tipping point when it comes to technology and subsequent electrical sensitivity.

I am not asking to remove technology. Rather, I am asking for the ability to choose on my own home the RIGHT to have an analog meter remain/instead. I have gone as far as to pay extra for a service which is already provided in order to keep my analog device. As a doctor and well informed on this subject I have gone as far as to purchase a home which had the meter furthest from the master bedroom in the floor plan! Being sure even an analog meter was not on the same wall of my bed was of critical importance to me. (Just as I have moved from a beautiful lake home in White Lake to rural Stockbridge because on this piece of property the reception from the nearest cell tower was poor, and the electromagnetic and microwave radiation was minimal.) While I do not exhibit any outward signs currently that can be called electrosensitivity, I can report that myself as well as my 100% rated disabled Vietnam Vet husband now sleep through the night and awake refreshed in our home, where in our previous house this was not possible, even with various protection techniques from the electrical grid, devices, etc. It has been subtle, however my husband has more energy than he did two years ago before we moved. That is how long it took before I even noticed this was happening.

Is it an oversight that Bill 4220 does not have an opt out clause for those who are informed and are willing to pay to **keep their analog devices, already installed and functioning**? To offer a bill where a digital meter would be forced upon me would have me looking at "off the grid" options. No, I am not a radical. I simply want the best environment for maintaining my health and that of my family. I have fought against "off the grid" options and moving in a direction of self-sustainability because being in community, including part of these United States is of value to me. Please maintain my RIGHTS as an individual!



**I urge you to explore authorities outside of the utility companies to learn all the facts.** Hear from those who are highly effected by digital meters. Did you know some people, and I have cared and/or advised hundreds, have even moved into tents on their property at times away from all electricity in order to take time to begin a recovery process. With the proliferation of cell phone towers and microwave technology this has been less of an option for those, and certainly in winter it is dangerous.

As you well know, special interest groups who fund their own research even those "well meaning" are influenced on a study's inherent structure. Here is an overview article offering scientific information which can be used for both arguments. Note though one important conclusion: "It is important to stress here the difficulties of demonstrating small changes in gene expression that may occur following in vivo exposure to EMF which are due to inherent variability of biological responses and the **technical limitations in the sensitivity of existing technologies.**"

[https://ec.europa.eu/health/scientific\\_committees/emerging/docs/scenihp\\_o\\_041.pdf](https://ec.europa.eu/health/scientific_committees/emerging/docs/scenihp_o_041.pdf)

This is why hearing from those individuals who are highly electro-sensitive, whose health, livelihood and their own "pursuit of happiness" is hindered unless they have the RIGHT to choose is VITAL. Please keep an open mind when listening to those who can very well come across as radical, feeble minded or even at times "mentally ill" knowing these people are affected by the cumulative effect of electricity and technological devices. Of course the most effected of these individuals will not be at the hearing as they are too ill expose themselves to such an environment. Thus what may sound as input from someone radical, know they are merely those defending our RIGHTS and represent a far larger, more affected group.

I can offer more information, however I doubt this email or the subject will be addressed properly. I pray it is otherwise.

Thank you for your consideration,

Fran

Dr. Frances B. Sterling  
4055 Milner Road  
Stockbridge, MI 49285